**Erosion: What Goes Up Must Come Down**

In this lesson, students will complete a hands-on activity in which they will discover that mountains erode at different rates and form different shapes as a result of their underlying composition.

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| **Concepts and  learning outcomes** | Students will understand that:   * Geologic forces that form and shape mountains are both constructive and destructive. * Erosion is a destructive force that sculpts and shapes all mountains.   + Mountains are usually made up of many types of rock.   + Some rock types erode more easily than others, producing differential rates of erosion in neighboring rocks.   + Differential erosion of rocky material produces jagged mountains as well as mesas, buttes, and exposing batholiths. |
| **Vocabulary** | mesa , butte, plateau, batholith, erosion, alluvial fan, weathering |

**Materials / Preparation**

* Students will use pages 14& 15 of their [Mountain Building Journals](http://www.teachingboxes.org/mountainBuilding/lessons/journal/MBJournal.pdf" \t "_blank).

**Preparation:**

* Pre-measure and prepare all materials for each group prior to the students starting this activity
* Mountain 1:1 cup sand
* Mountain 2: 1/3 cup sand + 2/3 cup gravel
* Mountain 3: 1/3cup gravel + 1/3 cup sand + 1/3 cup rocks
* Mountain 4: 1/2 cup sand + 1/2 cup gravel + 1 large rock underneath it all (representing a batholith)

Students record their ideas in the [Mountain Building Journal](http://www.teachingboxes.org/mountainBuilding/lessons/journal/MBJournal.pdf" \t "_blank).

**Procedures**

1. In the last Lesson, we focused on how mountains get built up by forces of volcanism and plate tectonics. However, as mountains get higher and higher, what happens to them
   * Look at the [Erosion Photos](http://www.teachingboxes.org/mountainBuilding/lessons/erosionImages/erosion.jsp" \t "_blank)
   * How do you think these mountain features were formed?
   * Do you think that all mountains erode at the same rate?
   * Why not?
   * How might the ability of different kinds of rocks to withstand erosion contribute to the shape of these mountains?
2. Today we'll investigate how erosion affects mountains made of different types of rocks.'
3. A. Use your spoon to mix enough water into their cup to make the materials “sticky” enough to make a mountain (sand castle consistency). Excess water is easily poured off.

B. Empty the contents of their cup onto the table forming a mountain. This can be done most gracefully as you would take a cake from a pan: Then, carefully lift the cup away leaving a perfectly shaped mountain to start with. For some mixtures, the mountain may not retain its shape too well and will collapse into a pile. If this happens, see if you can make the connection between this behavior and landslides on real mountains (both are caused by gravity!) Then they can form it back into a “mountain shape” before proceeding with the erosion.

d. Draw each mountain type (four of them) before continuing to the next step.

***Mountains should be drawn in side view (not birds eye view) on page 14 in their journals.***

1. Use the watering can/spray bottle to make your mountains erode. Make sure that you use a **gentle** flow of water to prevent the erosion from occurring too rapidly.
   * Observe and draw (side view not birds eye view) the same four mountains after erosion. Record your observations on page 14 of your journals.
2. CLEAN UP!!!
3. Review and Reflection: Have students answer the questions on page 15 in their journals: